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Original Article

EXPLORING THE PREVALENCE OF MEDICATION ERRORS IN KUWAITI HOSPITALS

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ABSTRACT

Objective: Reducing medication errors in Kuwaiti government hospitals through *pharmacovigilance* involves the improvement of medication safety culture achieve the desired outcome. The study explored the medication management practices in Kuwaiti hospitals and made recommendations for the improvement of medication safety practices. The aim of the study was to investigate the extent of medication errors in Kuwaiti government hospitals.

Methods: Medical records and systems audits, healthcare professionals' observation study, healthcare professionals survey. Data was collected from paper records, electronic records and systems and the observation study. Data was then analysed quantitatively and qualitatively.

Results: The study revealed important results at all five steps of the medication process. The audit revealed nearly half of the errors identified to have occurred during the prescribing stage.

Conclusion: The study revealed important results at all five steps of the medication process. The audit revealed nearly half of the errors identified to have occurred during the prescribing stage. The study highlights the need for an IT based, no-blame incident reports to be implemented and utilised in investigating adverse events and medication errors across the multiple sites in the Kuwaiti healthcare setting to guide reduction strategies and further improve standards of medication safety.

Keywords: Medication errors, Records and clinical audit, Clinical pharmacy, *Pharmacovigilance*, Medication errors prevention

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INTRODUCTION

Medication errors must be expected in any healthcare setting [1]. Errors involve; the failure to prescribe, dispense, supply or administer the correct medication in the correct dose by the correct route to a patient leading to an adverse health event. Such adverse events range from simple therapy failure to serious morbidity or mortality [2]. Pharmacological therapy is an integral part of modern medicine [3]. The rate of adverse events within the hospital setting is considered a key indicator of an institution's patient safety culture [4]. The successful identification, reduction and prevention of medication errors within the healthcare setting improves patient safety and facilitates the implementation of mitigation measures to further prevent or reduce them. Timely detection of medication errors is essential for both the person who caused the error, to be offered the required support and training, and for the patient, to reverse the impact of the error when possible, or minimise the harm if reversal is not possible, to preserve life and quality of life. Reviewing patient medical records helps in understanding the types of medication errors and their frequency of occurrence and is commonly used as a measure to assess patient safety [5]. Medical records audit is a process for quality improvement of health service processes with the objective of improving overall patient care [6]. They represent an effective research design in studies that explore the types and frequencies of medication errors [7] and accordingly, this was adopted as the initial step for this study. Whilst audit of medical records is useful, it is known to be prone to underestimate the magnitude of an issue, due to frequent missing information caused by inadequate information recording by the team treating the patient [4]. Medication error prevention is reliant upon periodic reviews of patient's notes, medication orders, prescription records, dispensing records, administration records and medication appropriateness incident records, with review and analysis to determine exactly how errors arose and to devise and evaluate prevention strategies.

In order to increase the accuracy of medication error recording, the reporting system needs to be accessible, confidential and robust, with a mandatory medication error reporting protocol in place [8]. Incidents in the healthcare setting continue to be under-reported, which limits its effectiveness as a key quality performance indicator [9]. One problem is that incident reporting, although predominantly designed as 'no-blame 'continues to be perceived as threatening for healthcare professionals (HCPs). Levinson [10], concluded that many individuals expressed concerns that incident report data was difficult to interpret due to inconsistencies of content and process. The author found that out of 111 medication errors identified by the audit, only 14 were recorded in the provided reporting system [10]. Vlayen *et al.* [4] noted that involving the multidisciplinary team in records audits facilitated access to records. This highlights the need for audits of both medical health records and medication error reporting systems to identify discrepancies in reporting.

MATERIALS AND METHODS

The design of this study involved audits of different types of record and recording systems, including near-miss reports. Multiple data points were utilized during the audit, including the stage of the cycle at which the error occurred (prescribing, dispensing, supplying, administration and monitoring), the type of medication error (e. g., type, route, strength, duration or dose) and three professions (doctors, pharmacists and nurses) were compared. Six hospitals were visited with the help of the local coordinator from the Kuwait Ministry of Health (MoH).

The hospitals serve 3,288,907 patients and employ 9,272 doctors, 1,656 pharmacists and 22,016 nurses. The six selected hospitals were each visited for a period of approximately two weeks. The quality control and legal departments at each hospital provided access to the paper and electronic records. All data collection was anonymous and in accordance with the data confidentiality and governance rules and regulations for both Kuwait and UK. A total of 3,000 incident reports were audited. The profession of the HCP who made the error and the HCP who reported the error were both documented.

The incident reports were evaluated for the error type, rated preventable or not preventable and error outcomes such as near-

misses or no harm, injury (harm) or death. Hospital follow-up action was documented as 'Yes' or 'No'. Follow-up action, if taken was recorded as additional data. The stage of error occurrence was also recorded. The role of the pharmacist was evaluated with respect to double checking, medication history and allergy review during medication reconciliation. Once the dataset was extracted, it was tabulated and presented in a categorical format.

The data was then analysed using SPSS™ V26 (IBM, Chicago, USA) software using descriptive statistics, test for means, and test for significance using the Chi-square test.

Sample selection

Ethical approval for the study was granted from the Kuwait MoH, the individual hospital sites and from the University of Wolverhampton Ethics in Human Research Committee prior to the conduct of data collection. Simple random sampling was used in the selection of data for medical records audit. A random number generator was used to select medical record numbers. A minimum of 50% sample of all patient records for each of the six hospital was reviewed and those who matched the selection criteria were then included in the audit for data analysis (fig. 1).

The sample selected were related to medication errors from prescribing records, administration records, dispensing records, patient notes, admission notes, discharge notes, outpatient notes, emergency department (ED) notes, surgical notes, and intensive care unit (ICU) notes. Records that were not related to medication management e. g., surgical procedures notes, and dressings notes, or nutrition management were excluded.

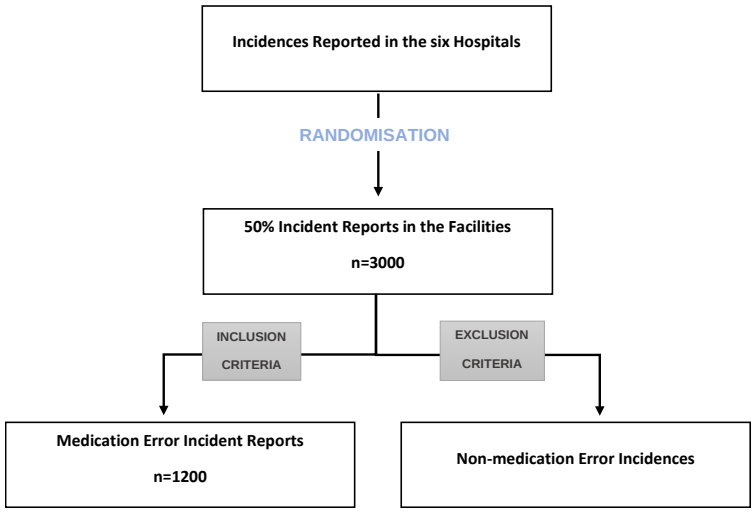

Fig. 1: Medication error records audit

RESULTS AND DISCUSSION

The audit looked at the completion of patient allergies records. Recording of allergies was found inadequate in four groups of wards (medical wards n=601, surgical wards n=484, paediatric wards n=487 and EDs n=897). Surgical wards had the best performance with more completed allergy record (60%) followed by paediatric wards (59%) then the medical wards (50%) and the EDs (25%). Prescribing medications without knowing the patient allergy status is one of the common medication errors which is considered as preventable, and when it is a second occurrence and can place patients at unnecessary risk [11]. Another common aspect of medication errors was illegible medication information [14]. Table 1 further shows the frequency counts of nine types of errors detected through double-checking by the second pharmacist during dispensing.

The highest number of errors were related to the prescriber's stamp covering medication information (5.4%) followed by the modification of medication information on the prescription form (4.7%). The majority of errors of this type were detected on forms from the medical wards. The medical wards exhibited the highest number of medication errors (13.7%) compared to the out-patient department (9.1%). This was lower than reported in other studies where those types of errors were reported at 36.3% [15]. The missing history information was collected from patients' records (electronic or paper-based), particularly for the patients on medical wards. This process clearly underlined the advantages of information technology (IT) based systems compared to paper ones, with IT searches completed in minutes compared to paper audits taking several days. Eleven fields were checked (table 2) in each chart (n=3000 records). Only 674 (22%) patients out of 3000 were not found to have any information missing in their records. Data regarding the HCP who made the omission was collected; doctor, pharmacist or nurse.

The highest missing information in records related to lifestyle e. g., physical activity, smoking, alcohol intake and diet (96%), and the most reliably completed records related to presenting complaints (34.0%). This is in agreement with the study conducted by Hosang *et al.* [12] who reported 86.4% of missing records of alcohol consumption. Hospital one had the most missing patient history records (11.5%) and hospital five was missing the least (9%).

There were 2,100 reported cases of adverse drug events (ADE) evaluated for the six hospitals (table 3). Once again there was a marked difference between the hospitals using IT based recording systems compared to paper-based systems. Searching and reviewing data took minutes rather than days and the information can be more readily collated and shared between sites. Most of the ADEs and severe side effects (SEs) were reported to the hospital by the patient (53.2%).

Hospital 5 showed the best performance with fewer patients reporting. This may be due to patients' counselling and signposting and to more HCP reporting (possible better vigilance in checking patients' outcomes). ADE reports that led to hospital visits were classified by severity (n=1500). Hospitals3 and 6 had the least recorded, classified events; however, this may be due to better error prevention processes or simple failure to report. Using a single factor one-way ANOVA test (significance of<0.05) mild ADE cases were significantly higher among all hospitals than moderate and severe cases (p = 0.003). There was no current classification for the medication-related events at the study sites. The impacts of medication errors caused by ADEs or severe SEs were classified by the researcher based on the patients' outcomes into events that led to death, to hospitalization, to life-threatening events, to severe pain, affected patients daily activities, or did not affect the daily patient activities. A total of 31,215 medication-related events were reported between January 2019 and July 2019 through the hospitals' compliance office. More than half of the reported events (59.4%) did not affect the daily activities for the patient. There was a significant

difference between hospital 3 compared to the other 5 hospitals (16.8%). This may be due to underreporting (negative) or better patient management practice (positive).

While there were only 2 deaths, any potentially preventable death is a learning opportunity, and all efforts should be made to prevent recurrence. Using a single factor one way ANOVA test a significant difference was found between the impacts of drug-related errors in the 6 hospitals (p = 0.003).

Table 1: Allergy/drug sensitivity status in medical chart from all hospitals selected wards

Allergy records (n=1200 prescriptions and medical charts per ward)	**Medical ward**	**Surgical ward**	**Pediatric ward**	**Emergency department**	**Total**	**% of total**	**SD ***
Total recorded status	599(49.9%)	716(59.7%)	713(59%)	303(25%)	2331	48%	29
Status not recorded	601(50.1%)	484(40.3%)	487(41%)	897(75%)	2469	52%	25
Medical records (n=13500 field out of 1500 records per department)	Medical ward		Out-patient		Total	% of total	SD*
Incorrect patient name and identification	68		32		100	1%	3
The drugs do not match the patient's diagnosis	157		87		244	2%	6
Wrong dose prescribed, dispensed or calculated or abbreviated	251		336		587	4.3%	13
Mistakes in dispensed or prescribed formula (mg/kg)	33		150		183	1.3%	16
Mistakes in prescribed or dispensed frequency/timing	139		52		191	1.3%	4
Mistakes in prescribed or dispensed route of administration	41		13		54	0.3%	8
Dispensing error due to look-alike, sound-alike drugs	252		363		615	4.5%	21
The doctor stamps obscure any prescription information	96		378		474	5.4%	39
Errors due to the omission	188		443		631	4.7%	45
Total errors per department	1225 (9%)		1854 (14%)		3079	23%	
Total correct entries	12275 (91%)		11646 (86%)		*23921*	89%	

*Standard deviation.

Table 2: Patient history for medical ward

Missing information	**H*1**	**H2**	**H3**	**H4**	**H5**	**H6**	**SD****
Chief complaint	164	190	166	144	131	226	34
History of the present illness	209	147	199	168	174	149	25
Past medical history	254	241	395	200	452	148	117
Surgical history	238	269	231	238	270	224	20
Drug Allergies	302	294	212	365	188	247	65
Medication history	313	283	320	277	203	367	55
A family medical History	728	327	320	505	322	507	162
Immunisation history	310	390	527	172	390	601	153
Sexual history	624	306	156	262	233	264	163
Lifestyle (exercise, diet, alcohol intake, smoking, illicit drugs use)	481	600	408	466	418	506	70
Obstetric history (female)	177	126	288	231	196	102	68
Total missing information	3800 (11.5%)	3173 (9.6%)	3222 (9.8%)	3028 (9.8%)	2977 (9%)	3341 (10%)	297
Total completed information	29200 (88.5%)	29827 (90.4%)	29778 (90.2%)	29972 (90.2%)	30023 (91%)	29659 (90%)	297

*Hospital, **Standard deviation

Table 3: Errors due to ADEs and severe SEs

	H1*	**H2**	**H3**	**H4**	**H5**	**H6**	**SD****
Person reporting the ADE (n=2100, 350 reports by hospital)							
Physicians	*79*	*88*	*68*	*65*	*101*	*95*	*15*
Pharmacists	*21*	*8*	*17*	*22*	*20*	*11*	*6*
Nurses	*65*	*77*	*83*	*81*	*68*	*82*	*8*
Total HCPs reports	165	173	168	168	189	188	12
Patient reports	185	177	182	182	161	162	11
The severity of the ADE (n=1500, 250 per hospital)							
Mild	*115*	*89*	*112*	*136*	*89*	*91*	*19*
Moderate	*81*	*118*	*46*	*78*	*104*	*78*	*25*
Severe	*36*	*39*	*27*	*28*	*50*	*21*	*10*
Total recorded with classification	232 (93%)	246 (98%)	185 (74%)	242 (97%)	243 (97%)	190 (76%)	
Recorded but not with classification	18 (7%)	4 (2%)	65 (26%)	8 (3%)	7 (3%)	60 (24%)	
Impact of medications related events (n=31215)							
Medication related event that did not affect the patient daily activities	3168	3274	2076	3218	3309	3494	509
Medication related event that led to hospitalisation due to toxicity or life-threatening event	2159	2091	873	1845	1754	2014	474
Medication related event that affected the patient daily activities	355	287	145	238	173	184	79
Medication related event that led to severe pain	107	152	72	78	83	64	33
Medication related event that led to death	1	1	0	0	0	0	0.52
Medication related event that did not affect the patient daily activities	3168	3274	2076	3218	3309	3494	
Total ADEs	8958 (29%)	9079 (29%)	5242 (17%)	8597 (28%)	8628 (28%)	9250 (30%)	

*Hospital, **Standard deviation.

The next analysis was conducted to identify the stage at which the medication error occurred from prescribing to the administration of the drug by the HCP, the carer or the patient. The first 1,200 error records (200 records from each hospital) were further reviewed. Most errors occurred at the prescribing stage (46.1%) (table 4).

More errors occurred in hospital 1 (34.6%) and the most compliant was hospital 5 (17%). However, it should be noted that the lower percentage can also be due to lack of reporting or recording. The standard deviation indicates similar practice in all hospitals which may reflect the lack of guidelines, governance and the need for better electronic systems for prescribing (electronic prescribing), dispensing (barcode scanners)or administration (barcode scanners). Comparing the stages of medication errors by hospitals a significant difference (p<0.001) was found. Medication errors during prescribing were the highest compared to all other stages at all hospitals ($p= 0.001$).

The objective for this analysis was to understand which profession showed the highest number of medication errors. The researcher sampled the first 1,200 errors record and found that most of the errors (23.4%) were made by doctors (table 5). Patient reported errors were the highest number, followed by physicians and nurses, while pharmacists showed the least reported the medication errors (p = 0.001).

Table 4: Stage of error occurrence

Medication errors occurred (n=1200 records, 4800 items, 800 items per hospital)	H1*	H2	H3	H4	H5	H6	SD **
During Prescribing	95	116	77	150	54	61	36
During Dispensing	79	24	40	22	42	37	21
During Administration	75	49	41	11	18	76	27
During Monitoring	26	16	23	21	22	25	4
Total errors per hospital	275 (34%)	205 (26%)	181 (23%)	204 (26%)	136 (17%)	199 (25%)	

*Hospital, **Standard deviation.

Table 5: Frequency table of initiator of the error

Initiator of the error (n=1200 records, 200 per hospital)	H1*	H2	H3	H4	H5	H6	SD**
Doctors	52	68	41	45	34	41	12
Pharmacist	21	30	32	25	25	34	5
Nurse	43	29	37	38	28	35	6
Patient	39	34	45	24	44	37	8
Carer	20	22	19	18	31	22	5
Total error per hospital	175 (87.5%)	183 (91.5%)	174 (87%)	150 (75%)	162 (81%)	169 (84.5%)	

*Hospital, **Standard deviation.

Data were collected with respect to the errors made, on the root cause trigger that initiated corrective actions or pharmacists' clinical intervention which primarily included the following four groups of errors: medication appropriateness (therapeutically not indicated or inappropriate route, dose, duration, strength, formula), drug-disease interaction, drug-drug interaction, and drug-food interaction.

Of 1,200 medical records reviewed, drug-drug interaction was the highest occurrence to trigger pharmacist clinical intervention (34.5%), followed by inappropriate prescribing at 31.7% while one of the studies reported the wrong timing error (46.9%), unapproved drug error (25.4%), omission error (18.5%), and dose error (9.2%) were the most common forms of medication errors [16]. It is worth noting that 12% in all hospitals were recorded without a root cause, which can be seen as inappropriate practice to conceal the root cause. This should be taken into account when reviewing the current processes and procedures for rectification. Hospital 2 showed the best performance in recording the root cause of the errors and hospital 1 the poorest performance (table 6).

Medication errors have also been evaluated based on interventions among the surveyed hospitals. Drug-drug interaction, drug-food interaction, drug-disease interaction, and inappropriate prescribing were recorded as *pharmacovigilance* failures. This study showed significantly (p<0.001) different in levels of *pharmacovigilance* failures in all hospitals.

Table 6: Medication errors occurred during prescribing and dispensing resulting from poor medication reconciliation

***Pharmacovigilance* failure (n=1200, 200 medical records per hospital)**	H*1	H2	H3	H4	H5	H6	SD**
Inappropriate prescribing	*63*	*74*	*51*	*66*	*71*	*55*	*9*
Drug-drug interaction	*43*	*81*	*69*	*93*	*66*	*62*	*17*
Drug-food interaction	*21*	*25*	*33*	*28*	*30*	*47*	*9*
Drug-disease interaction	*13*	*17*	*14*	*9*	*10*	*11*	*2*
Total classified errors	140 (70%)	197 (99%)	167 (84%)	196 (98%)	177 (89%)	175 (88%)	21
Total unclassified errors	60(30%)	3(1%)	33 (16%)	4 (2%)	23 (11%)	25 (12%)	21

*Hospital, **Standard deviation.

Medication error incident resolution

Next, data analysis was performed to understand the resolution action taken in response to the medication error or adverse events (table 7). A resolution action is typically taken when the medication error has already been made. The most commonly used channel is to call the physician for verification of the issue. This means that the nursing staff typically calls the physician to verify whether this is indeed an error and if a correction needs to be made in the dosage or type of medication.

The data does not tell whether the resolution actions were taken in response to a near-miss or after administration. Calling the physician for verification action accounted for 38% of all the

resolution actions followed by sending a written note to doctors (24%) or to the department (16%). Hospital 1 was the most proactive to take actions (98%) and hospital 2 had the least records of resolution action (80%).

Table 3: Frequency table of type of resolution or action taken by the pharmacist

Pharmacist clinical intervention (n=3000)	H*1	H2	H3	H4	H5	H6	SD+/-**
Call doctor for verification	236	110	143	147	185	149	44
Risk assessment	12	9	16	7	9	15	4
Staff education and training	1	1	3	0	2	2	1
Written note to doctor	85	108	136	112	125	121	18
Root causes analysis performed	41	23	49	32	22	47	12
Return drugs to pharmacy	31	41	48	40	36	50	7
Drug was not supplied	18	22	18	16	17	27	4
Memo sent to department	68	86	74	84	76	63	9
Total interventions per hospital	492 (98%)	400 (80%)	487 (97%)	438 (88%)	472 (94%)	474 (95%)	35
Total 'no action taken or known'	8 (2%)	100 (10%)	13 (3%)	62 (12%)	28 (6%)	26 (5%)	35

*Hospital, **Standard deviation.

Training sessions provided to the pharmacists

Courses and workshops provided to pharmacists was one form of intervention to reduce medication errors. The Kuwait MoH did not provide any free or charge courses. The Kuwait Pharmaceutical Association had provided 5 free, and 20 paid, workshops while pharmaceutical companies had provided 310 free workshops.

The overall detail of reported events, and actions taken against medical errors, are shown in table 12. A one-way ANOVA test revealed a non-significant difference ($p>0.05$) between the hospitals, which is suggesting the same number of actions have been taken in each hospital to reduce medical errors. However, the count and percentage of no actions taken were significantly ($p<0.05$) higher than the action taken in each hospital.

Table 8: Details of reported events and actions taken against medical errors

Type of incident	H*1	H2	H3	H4	H5	H6	*F (df)*	*p-v-alue*
Near misses	104 (21%)	182 (37%)	184 (37%)	201 (40%)	179 (36%)	206 (41%)	1.96 (5)	0.234
Medications reached the patients	365 (73%)	256 (51%)	206 (41%)	245 (49%)	240 (48%)	231 (46%)	0.62 (5)	0.476
No indication if medications reached the patients or not	31 (6%)	62 (12%)	110 (22%)	54 (11%)	81 (16%)	63 (13%)	0.42 (5)	0.749
Actions taken-Yes	167 (33.4%)	179 (35.8%)	202 (40.4%)	184 (36.8%)	163 (32.6%)	218 (43.6%)	0.09 (5)	0.781
Actions taken-No	333 (66.6%)	321 (64.2%)	298 (59.6%)	316 (63.2%)	337 (67.4%)	282 (56.4%)	0.09 (5)	0.725

*Hospital

CONCLUSION

This audit investigated medication error rates across six hospitals in Kuwait. Our findings indicated that prescription errors were highly prevalent, with wrong duration making a large percentage of errors made at the dispensing stage of the medication process. This study also highlighted the important role of HCPs in medication error prevention and reporting. This study again reinforced the important role of maintaining up-to-date, accurate, comprehensive and accessible medical records and hospital information to provide sufficient information to HCPs to enable them to make sound decisions in patient care informed by the full patient characteristics, medical history, medication history and any other additional information such as social and lifestyle factors. The differences between the study sites using IT vs. paper-based solutions underlines the ease brought to this process of having IT-based systems both in terms of speed of the process on-site and the increased ease of sharing data and lessons between sites.

The study highlights the need for no blame incident reports to be appropriately utilised in investigating adverse events and medication errors across multiple sites in the Kuwaiti healthcare setting to guide reduction strategies and improve standards across the healthcare system.

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AUTHORS CONTRIBUTIONS

Conceptualization, Methodology, Validation of the Analysis: MS and HM; Investigation: MS; Supervision and Project Administration: HM and PB; Draft Preparation: MS, HM and PB

CONFLICTS OF INTERESTS

The authors declare no conflict of interest.

REFERENCES

1. Safholm S, Bondesson A, Modig S. Medication errors in primary health care records; a cross-sectional study in Southern Sweden. BMC Fam Pract. 2019;20(1):110. doi: 10.1186/s12875-019-1001-0, PMID 31362701.
2. NCCMERP. About medication errors: national coordinating council for medication error reporting and prevention; 2022. Available from: https://www.nccmerp.org/about-medication-errors. [Last accessed on 14 Jun 2022].
3. Karimian Z, Kheirandish M, Javidnikou N, Asghari G, Ahmadizar F, Dinarvand R. Medication errors associated with adverse drug reactions in Iran (2015-2017): a P-method approach. Int J Health Policy Manag. 2018;7(12):1090-6. doi: 10.15171/ijhpm.2018.91, PMID 30709084.

4. Vlayen A, Marquet K, Schrooten W, Vleugels A, Hellings J, De Troy E. Design of a medical record review study on the incidence and preventability of adverse events requiring a higher level of care in Belgian hospitals. BMC Res Notes. 2012;5:468. doi: 10.1186/1756-0500-5-468, PMID 22931859.
5. van Melle MA, Zwart DLM, Poldervaart JM, Verkerk OJ, Langelaan M, van Stel HF. Validity and reliability of a medical record review method identifying transitional patient safety incidents in merged primary and secondary care patients' records. BMJ Open. 2018;8(8):e018576. doi: 10.1136/bmjopen-2017-018576, PMID 30104308.
6. HQIP. Quality improvement for patients and the public: healthcare quality improvement partnership Ltd; 2020. Available from: https://elearning.hqip.org.uk/introduction-to-qi/. [Last accessed on 14 Jun 2022]
7. Montesi G, Lechi A. Prevention of medication errors: detection and audit. Br J Clin Pharmacol. 2009;67(6):651-5. doi: 10.1111/j.1365-2125.2009.03422.x, PMID 19594533.
8. Handler SM, Nace DA, Studenski SA, Fridsma DB. Medication error reporting in long term care. Am J Geriatr Pharmacother. 2004;2(3):190-6. doi: 10.1016/j.amjopharm.2004.09.003, PMID 15561651.
9. Westbrook JI, Li L, Lehnbom EC, Baysari MT, Braithwaite J, Burke R. What are incident reports telling us? A comparative study at two Australian hospitals of medication errors identified at audit, detected by staff and reported to an incident system. Int J Qual Health Care. 2015;27(1):1-9. doi: 10.1093/intqhc/mzu098, PMID 25583702.
10. Levinson DR. Hospital incident reporting systems do not capture most patient harm. ASp. 2012.
11. Harig A, Rybarczyk A, Benedetti A, Zimmerman J. Clarification of drug allergy information using a standardized drug allergy questionnaire and interview. P T. 2018;43(8):480-504. PMID 30100688.
12. Hosang S, Kithulegoda N, Ivers N. Documentation of behavioral health risk factors in a large academic primary care clinic. J Prim Care Community Health. 2022;13:21501319221074466. doi: 10.1177/21501319221074466, PMID 35352577.
13. Velo GP, Minuz P. Medication errors: prescribing faults and prescription errors. Br J Clin Pharmacol. 2009;67(6):624-8. doi: 10.1111/j.1365-2125.2009.03425.x, PMID 19594530.
14. Khammarnia M, Ravangard R, Barfar E, Setoodehzadeh F. Medical errors and barriers to reporting in ten hospitals in Southern Iran. Malays J Med Sci. 2015;22(4):57-63. PMID 28729811.
15. Shitu Z, Aung MMT, Tuan Kamauzaman TH, Ab Rahman AF. Prevalence and characteristics of medication errors at an emergency department of a teaching hospital in Malaysia. BMC Health Serv Res. 2020;20(1):56. doi: 10.1186/s12913-020-4921-4, PMID 31969138.
16. Benjamin A. Audit: how to do it in practice. BMJ. 2008;336(7655):1241-5. doi: 10.1136/bmj.39527.628322.AD, PMID 18511799.